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United States Patent [19]

Stuart

[11] **Patent Number:** **5,317,877**[45] **Date of Patent:** **Jun. 7, 1994****[54] INTERCOOLED TURBINE BLADE COOLING AIR FEED SYSTEM**[75] **Inventor:** Alan R. Stuart, Hamilton, Ohio[73] **Assignee:** General Electric Company, Cincinnati, Ohio[21] **Appl. No.:** 923,676[22] **Filed:** Aug. 3, 1992[51] **Int. Cl.⁵** F02C 7/16[52] **U.S. Cl.** 60/736; 60/39.75[58] **Field of Search** 60/39.07, 728, 736, 60/39.75; 415/115, 116**[56] References Cited****U.S. PATENT DOCUMENTS**

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Primary Examiner—Louis J. Casaregola
Attorney, Agent, or Firm—Jerome C. Squillaro; John R. Rafter

[57] ABSTRACT

A gas turbine engine having a compressor and an air-cooled turbine is provided with a cooling system for decreasing the temperature of the turbine cooling air. A heat exchanger, mounted on the compressor casing, receives a portion of the pressurized air which is bled through the compressor. A heat sink medium is pumped through the heat exchanger into heat exchange relationship with the pressurized air, thereby cooling the air. The cooled air is then further pressurized and routed to and circulated through the turbine rotor blades to provide improved cooling thereof. The intercooling of the compressor bleed air permits a reduction in the quantity of compressor air required for turbine rotor blade cooling or allows an increase in turbine entry temperature and thus provides an improvement in engine power and performance. In the case where the heat sink medium is engine fuel, the heat extracted from the compressor bleed air is returned to the engine operating cycle in the form of heated engine fuel.

16 Claims, 3 Drawing Sheets